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AVIATION AND AIRCRAFT JOURNAL



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VOLUME XI
Number 3

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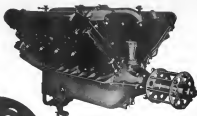
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200 H.P.	200 H.P.	200 H.P.
220 H.P.	220 H.P.	220 H.P.
240 H.P.	240 H.P.	240 H.P.
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To a Contemporary

WE take pleasure in extending congratulations to our British contemporary, *The Aeroplane*, on the occasion of its tenth anniversary. The publication has passed through periods of varied prosperity and adversity with characteristic British good sense.

Under the guidance of Charles G. Grey, known to his readers as the "C. G. G.," a publication known which contains a sound knowledge of things aeronautical, *The Aeroplane* has given to the aviation community contributions both substantial and brilliant, and as *American and American Journal*, stands hearty good wishes and hopes for the continued prosperity of *The Aeroplane*.

American Aviators in Canada

FOR the third time the Air Board of Canada has extended the time limit during which certain classes of American aircraft and pilots will be permitted to enter and fly in the Dominion provided they fulfill certain requirements in accordance with the International Air Convention.

Pilots must either possess a national or a special certificate to cross the border, which however does not entitle them to carry passengers or merchandise for hire, for their home is deemed to correspond only to the "private air pilot's license" provided for by the Convention. The countries signatory to the Convention issue to pilots of commercial aircraft a special certificate, which also entitles its possessor to engage in commercial flying.

As to American private aircraft which cross into Canada, they must bear the nationality and registration marks provided for in the Convention, and if they are to carry passengers or merchandise for hire they must be provided with a certificate of airworthiness. As there does not exist an authorized agency in the United States for the issue of such certificates, it appears that the Air Board of Canada will provide American aircraft with temporary certificates to enable them to fly in the Dominion. Judging from the provisions of the International Convention, American pilots would likewise have to be given temporary "commercial air pilot's licenses."

We are dealing with this matter at some length not only to show the great and continued activity the Canadian Air Board displays to facilitate aerial relations with the United States despite the many difficulties this involves with respect to the International Convention; but also to take the opportunity for pointing out how urgent it is that Congress either ratify the Convention or else that the government enter into a separate air navigation agreement with Canada.

It should be plain to all that we cannot continue to regulate American-Canadian air traffic on the basis of provisional agreements which have to be renewed every six months just because Congress fails to show any interest in the matter. It

is true that there is no Air Department or any other governmental agency to which American aviators can apply to and the chaotic state of affairs, for the Army and Navy are only indirectly interested in civil aviation. As a result no centralized agency in the United States can be held responsible for the haphazard state which prevails in American aviation and which causes its hasty expansion.

It is not only in the interest of border traffic that federal air legislation is urgently needed; indeed, there is even greater urgency for its enactment on the ground of general safety, for only a federal air law can put an end to the activities of irresponsible pilots, and aircraft of doubtful age and airworthiness.

Progress in Methods of Transport

ALL great advances in science have had opponents. The practical application of scientific advances have developed for their success on the support of the public. This support is given when the public is educated to an appreciation of what a discovery means.

Methods of transportation in general, because the factor of personal safety is so largely involved, have been the greatest sufferer in the matter of public support. Automation, in particular, is weathering the storm which its proponents in the realm of transportation have weathered before securing the support of the public.

During the use of the auto was thought to be a hazardous adventure. Crossing the ocean under steam power was considered dangerous. Riding on a railway train, motorizing, travelling in the subway, or in the tunnels under the city have all been thought dangerous in their respective periods of introduction.

The public thinks differently now. Education has shown advantages to outweigh disadvantages. For that reason people still travel by the recognized methods of transportation, despite countless cases of slips, trips, falls, and other such occurrences.

Automation as a method of transportation is in its infancy and will survive on all prevailing methods of transportation have survived. The dominating factor in its survival will be speed.

In considering the existing methods of transportation it is of interest to notice two facts. One is that each method has provided some speed to its proponent. The other is that each method has not supplanted any other, but has fitted into its proper place in the whole scheme.

So well it be with automation. Speed will make it survive, and it will supplement other methods of transportation by taking its place where it is most needed.

Before there is a steady, however, blindness will be made and accidents will happen with their consequent casualties on they have throughout the history of the development of all methods of transportation.

reliable than is the case at present. It is therefore recommended that:

21. *As to about the use of this airplane a single engine is preferable to two coupled together.*

And moreover (without entering into the details of the reward or indemnification requested) that:

22. *It is desirable to provide designers of engines for commercial purposes with a much greater incentive for securing increased life than is given to-day.*

Engines. *Review.*—The Committee further recommended that:

23. *Where one engine only is used, the advantages offered by an engine even do not appear to warrant its adoption.*

Deviations of Engines.—In connection with recommendation 21, it is felt that, since a single engine may fail, a reserve must be provided consisting of lower wing power, in the case of weight and without obscuring the control thrust, while yet keeping the two engines and their propeller drive completely separate, in an adequate margin of aerodynamic study.

It is therefore felt that:

24. *A desirable type of machine would be one equipped with two engines to such a manner that in the case of one engine failing, there would be no interference with the other and an additional source of delivery of the airplane to be constructed, and that level flight would be maintained.*

A method discussed was to mount two totally independent engines in a central fuselage, with each engine driving its own propeller, the propellers shafts being concentric and the fuel system independent.

Control Design

Testing.—The Committee recommended that:

25. *During the test mentioned in recommendation 13 of the plan, sufficient time, place, and facilities of the airplane should be observed and found satisfactory.*

Control.—A large item of the expenditure in running a commercial airplane service is the material of control cables. As it is only a very small length that becomes worn—usually owing to friction from passing through fairleads or over pulleys—it is recommended that:

26. *Control cables should not pass through fairleads or pulleys, or, if it is said, the steel or galvanized steel be separated, removable and be fitted with an adjustment. The design of controls should, further, be such as largely to reduce the proportion effect of the cables stretching under load.*

It is noted that in the present design the relation of the amount of movement caused by stretch to the total movement is enormous.

Moreover:

27. *It is desirable to lighten the control effort at normal flying speeds and increase the magnitude of the control effort at low speeds.*

To simplify the meaning of this, the employment of variable gear ratios throughout the range advocated, the gear being lower in the central portion of the range and higher at the extremes.

The Committee recommended as general that:

28. *The solution of the problem of retaining control for stability at or below the stalling speed shall be an urgent study and research both in the laboratory and on the full scale.*

In this connection it is also recommended that:

29. *Clear attention should be paid to the proportion of all members a considerable amount of recent information on this subject is now available.*

Undercarriage.—For unexplained reasons on absolute necessity it is desired that the undercarriage should form a unit readily separable from the fuselage for replacement. Experience shows that serious loss of service capacity is occasioned by the lock-up of machines for undercarriage repair when the rest is undamaged. To facilitate the moving of airplanes on the ground with a small ground staff is an analogous requirement, and therefore it is recommended that:

30. *The undercarriage and tail end should be easily detachable and replaceable, and for facility of landing on the ground the tail end ought to be replaced by a storable wheel capable of being braked.*

Further, it is recommended that:

31. *A design of undercarriage with much greater capacity for absorbing energy without rustification, while leaving sufficient springing for steering, should be studied.*

(It is to be noted that the pneumatic tires now used aboard and restore too much of the energy.)

32. *The airplane should be so designed that failure of the undercarriage does the minimum of damage to the fuselage.*

As an example of what is here intended may be mentioned that of a successful joint of the top of the undercarriage struts, such that, in the event of the undercarriage collapsing entirely, damage to the fuselage may be avoided.

Propulsion.—The use of two-linked propellers leads to vibration which is a harm, or if the case is not passed to the loss of flight, and it is considered that:

33. *The fitting of propellers with more than two blades is desirable.*

It is also considered that:

34. *The fitting of propellers with detachable blades, preferably adjustable as to pitch, is worthy of development for an experimental study.*

Control of Resistance.—It has been represented that in the light of present knowledge sufficient importance is not always assigned to the necessity for good understanding of all parts of an airplane, and the Committee therefore recommended that:

35. *Attention should be paid to the original design to the reduction of resistance and keeping all conveniences to the minimum.*

It is understood for example, the downsizing of the wing adjustment in such a way as to fall off into the fuselage will in contact cause a considerable reduction in resistance.

Plan Form.—It is generally for an adequate field of view for the pilot, not only forward, but also to the sides and to the rear, though studied in some designs, is suggested as often. As force increases in volume the risk increases. If sufficient area is available, it is of course impossible that the pilot should have an adequate field of view in such direction. It is thought that at present there is no authority to enforce this and to effectively warn off an airplane, whether British or foreign, which might be known to be dangerous. Accordingly, it is recommended that:

36. *Provision should be taken to secure by regulation or inspection the provision of a proper field of view for the pilot.*

Emergency Exit.—It is not always possible for passengers to make their exit from airplanes in certain positions, in the event of a crash, and even where it may be possible to escape by making a hole in the fabric covering the fuselage represents where that passengers are not aware of this fact. It is recommended that:

37. *The provision of emergency exits for rapidly discharging passengers in the event of a crash, in whatever position the airplane may be, and the indication of such means of egress, should be made compulsory.*

Fire Protection.—In view of the work on hand of the Committee specifically studying the subject of fire precautions, the question is not here entered upon, though attention is called to the airplanes.

(It is continued.)

Aeromarine U.S.D. Engine Completes 50-Hr. Test

The Aeromarine, Type U.S.D., 8 cylinder engine has just completed a successful 50-hr. test by the Kapapereus Division at Bedford, England. This engine has a bore of 11 in., a stroke of 6 1/2 in. and a total gross displacement of 528 cu. in. The weight is 567 lb. dry. The normal power output is 150 hp. at 1750 r.p.m. but the engine will be choked down to 100 hp. at 1400 r.p.m. for training purposes. The engine passed several original failures of design. The water jackets of the two cylinder blocks are cast integral with the upper half of the crank case. The cylinder liners are steel tubes which are inserted in the casting. The big A reversible block is used for each cylinder block, consisting of an aluminum casting with steel water passages and steel inserts for the valve seats. The reversible block will, undoubtedly, prove a great convenience in the maintenance of this engine, as the reversible block can be reversed in a very few minutes. It will also be possible to remove the head and replace it with another in which the valves have been ground without removing the engine from the airplane.

The Saulnier Three-Engine Monoplane

Raymond Bessinger, chief engineer of the Monnier-Bessinger Airplane Co., recently completed the plans of a three-engine monoplane which embodies many novel features. The machine is now under construction, in part at the Monnier-Bessinger factory, and in part at the plant of the Lorraine-Dietrich Co. The latter firm will probably supply the engine for the power plant, although it is possible that some 400 hp. Liberty engine will be used instead. The Lorraine-Dietrich engine which it is intended to use develops 275 hp. each.

As may be seen from the accompanying outline drawings, the new machine is a three wing cantilever monoplane with a central engine mounted in the core of the fuselage and two outboard engines mounted on the wings. The form of the wings is noteworthy, the entire sections being of uniform chord and depth, while the outer sections taper towards the tips both in chord and depth. All the control surfaces are balanced. The engines are spaced in such manner as to prevent "interference" of the respective propeller disk areas. A tunnel leading from the control cockpit to both wing engines enables the engineer to make minor adjustments while the machine is in flight, while the central engine may be directly reached from the control cockpit.

The fuel tanks are situated in the depth of the wing just aft of the outboard engines, no fuel being carried in the fuselage. Provisions are made for the immediate emptying of the fuel tanks should the necessity arise. The central fuel capacity is sufficient for a 7-hr. flight with full load.

The fuselage is of rectangular section with rounded, tapering forward into the control cabin mounting with a square honey-comb radiator, while aft the fuselage tapers toward a vertical keel edge which carries the monoplane tail unit.

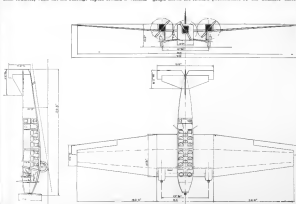
The control compartment is fitted with two seats abreast of the wings, affording excellent all round visibility. Under the control cockpit there is a baggage room and aft of it is a spacious passenger cabin, seating sixteen persons in three rows. Aft to the cabin is led by means of two side doors aft of the seats, the head which a wash room is provided.

The structure of the machine is entirely built up of metal streamlining, the surfaces of the wings and fuselage being use of fabric. The wing spars are duralumin lattice girders. The entire structure has been exhaustively tested at the Eiffel laboratory and on two a scale model of the machine. According to L'Aviation, in which the machine is under construction, the machine is based, the wind tunnel tests have given the best aerodynamic results ever registered at the Eiffel laboratory. The model used for the tests was on the scale of 1/10th and the results obtained were as follows (It. and Kg. being expressed in grams meter seconds).

Incidence	5°	6°	8°	10°
R_x	22.5	22.5	46.1	71.1
R_z	97.5	102.5	424.6	622.7
R_y	0.725	0.644	0.1060	

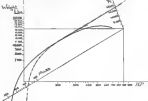
The best value of R_x is 0.093, which was attained at an angle of incidence between 7 and 8 deg.

The accompanying graph shows the relative performance of the Bessinger three-



engined airplane according to wind tunnel tests and that of the Stinson Zeppelin four-engined airplane. The latter is equipped with four 300 hp. Mercedes engines.

The weight empty of the Stinson airplane, as designated, is approximately 5500 lb., of which 4500 lb. represents the weight of the engine. The designated useful load is about 6000 lb. so that weight loaded will be 15,500 lb. The machine was designed to fly with full load on two engines only, in which case the horizontal speed is decreased. With three engines running,



PERFORMANCE GRAPH OF THE STINSON (FULL LOAD) AND STINSON-ZEPPELIN (SINGLE ENGINE) AIRPLANES

The ceiling at full load is over 15,000 ft., and the maximum horizontal speed 150 m. p. h. Carrying 5 hp. fuel and oil, a pay load of about 3000 lb. can be carried a distance of 500 miles. The indicated section of the French air service has already placed an order for one machine of this type with which extended experiments will be carried on.

The general characteristics of the Stinson three-engined airplane is as follows:

GENERAL CHARACTERISTICS OF THE STINSON THREE-ENGINE AIRPLANE	
Empty weight	5500 lb.
Useful load	6000 lb.
Maximum altitude	10,000 ft.
Maximum speed	150 m. p. h.
Range	500 miles
Engine	300 hp. Mercedes
Wing area	1,200 sq. ft.
Wing span	37 ft. 6 in.
Wing chord	37 ft. 6 in.
Wing loading	14.5 lb. per sq. ft.
Power	900 hp.
Power weight ratio	16.4 hp. per lb.

Air Transport in Latin America

Mexico. Plans will soon materialize for a commercial air service between Ciudad Juarez and Chihuahua City. The distance between these two points is 320 miles by rail, and the journey takes 10 km. The wagon route is so bad that a long detour through Fabens, Tex., is necessary and even with a good automobile it takes about 10 hrs. to make the trip. The airplane of the new service will easily make the journey in two hours. It is proposed later, since General J. W. Dye, to make special flights throughout the state of Chihuahua for the accommodation of river canners and others. American planes piloted by Americans will be used and pending the solution of a landing field at Juarez, permission has been granted for the use of Fort Bliss, near El Paso, Texas, across the border from Juarez.

Bolivia. There was among the earlier South American supporters of aviation, especially for commercial purposes. Toward the end of last year the government formed the first school of aviation, conducting with General Donald Hadden, an American aviator, to act as director of the Institute. Since then, the Administration has maintained its interest in aerial transportation. A recent effort has been the inauguration of, and support for, a new aviation society known as La Sociedad Boliviana de Transportes Aereos, which has been formed upon an equitable basis to promote commercial aviation throughout

the country. The government has given to the new undertaking the right to operate an air-line between Cochabamba and Santa Cruz. For this purpose there will be put into use four triplanes of the American type, capable of carrying six passengers and a ton of cargo, the journey between the two points mentioned being estimated to occupy an hour. The headquarters of the new aviation society will be established at Cochabamba.

Colombia. The Republic of Colombia is also commercially interested in the regulation of aviation, in which a number of foreigners are taking active part. The government has now issued a decree which classifies privately-owned aircraft into two sections according to their nature, as touring or commercial aircraft. All flying machines entering the country are required, and the utmost care taken to see that no flights are undertaken until the machine has been thoroughly tested. Aircraft which are the property of the government are to be employed exclusively for military purposes, carrying the corps, for the customs, and police forces. Private aviation companies are already established or to be established in the industry of the republic will be considered as national, while all private aircraft, whether used for touring or commercial purposes, will bear the same designation. Private aircraft companies will be obliged to give a declaration to the ministry of war to the effect that they will comply with the rules for aviation now accepted.

Guatemala has already been interested in connection with commercial flying, a company scheduled to be by local means having a capital of \$100,000. It is expected to extend the local service, which hitherto has not done very much in the direction of practical flying, from Barmaguala to San Juan. Such matters are being carried on by the company, as the Dutch Part of Caracas, opposite the territory of Venezuela. Each machine is to be able to carry five passengers and a ton of cargo. Plans have been made for the construction of three Kanamers, an aviation engineer, under whose instruction six hangars and workshops have been partially completed at Barmaguala. In the meantime arrangements are being made for an air-line service between Barmaguala and Orizaba, about 300 miles up the Magdalena River, a journey which is expected to occupy one hour, including a number of short calls at various towns along its route. This service will be for both passengers and cargo.

Brazil. An important aerial transport company has been formed at Rio Grand do Sul, for the purpose of ensuring a regular transport service between the capital and the various Brazilian and various centers in the neighboring states. The machines for this service are of French manufacture.

Aerial Photography and Agriculture

For the purpose of demonstrating the many uses of aerial photography is being management and agricultural development. First Lieut. George W. Goodland and Howard K. Russell, Air Service, were ordered, on May 18, to proceed by airplane from Bolling Field, Annapolis, D. C., to Ancker, Mass., for the purpose of making a reconnaissance of the territory in the vicinity of the Massachusetts Agricultural College.

The itinerary of the flight was Bolling Field to Marsh Field, Long Island, thence to Ancker, thence to Boston, thence to Portland, Maine.

The flight from Washington to Portland was made in five hours, and the total time consumed in performing the photographic reconnaissance was nine days from time of departure to return.

Mission was made from an altitude of 12,000 ft. for the Agricultural College at Ancker of 175 square miles of territory, the time consumed in taking the photographs being two hours. Mission was also made of Portland and of Boston showing the docks at both ports.

This work was done by the U. S. Army Air Service in cooperation with the Agricultural Department, Ancker College, and the Shipping Board. In the short time consumed in performing this work and the completion of detail as shown by the mission produced, demonstrate the value of aerial photography in agricultural development and engineering enterprises.

Canada's Commercial Air Policy

In reply to numerous inquiries received by the Air Board of Canada regarding the present and future prospects of civil aviation development in the Dominion the following statement appears in General Progress Report No. 7 (May 1932) issued by the Air Board of Canada:

The Canadian government fully realizes the importance and ultimate possibilities of civil aviation in a country like Canada and has adopted the policy of encouraging it along the following lines:

- (1) The regulation of civil flying; the inspection and registration of machines, certification of personnel, and the inspection and licensing of airfields, on the principles laid down by the Convention for International Air Navigation.
- (2) The establishment of a Transport Branch under the Air Board, the services of which are freely placed at the disposal of promoters of air undertakings.
- (3) The survey of air routes and the provision on necessary air routes of emergency landing grounds, where necessary, between urban centers along key routes.
- (4) The establishment of an Operations Branch which concentrates in the carrying out of such flying operations with leave-time air machines as are required for the various departments of government in relation to forests, fisheries, surveys, customs, etc., and to scientific experimental work.
- (5) The loan of aeroplanes and lighter-than-air equipment to individuals on application.

The Canadian government has not undertaken to subsidize directly any commercial air service. The view taken has been that such services were not at present likely to be profitable in Canada if operated independently of the existing railway and steamship companies. The railway and steamship companies between large centers in Canada are efficient and an exception, if it involved the maintenance of expensive administrative and auxiliary departments, has been thought likely to be uneconomical. Existing transcontinental organizations have, on the other hand, not shown any desire to establish their own air services. There is, moreover, an independent field for air operations in the sparsely settled and undeveloped portions of Canada in which at present communications are inadequate. Exploration and communication services by aircraft in these areas depend chiefly upon timber, mining or the development of agriculture being required, and with the services of the Technical and Operations Branches of the Air Board, operate advantageously and profitably. Such individual interests do not, however, justify direct assistance or public grants.

To sum up, the view of the Canadian government has been that commercial aviation was for the present to best encourage

and developed by administrative assistance and the provision and improvement, where necessary, of ground equipment, not, however, including special subsidies serving no other ends. There is a possibility that, as time goes on, so many of these may be required that for the government to undertake the provision of such ends, would have the effect of stifling local effort and thus hinder rather than advance present development.

American Civil Aircraft in Canada

The Air Board, Ottawa, Canada, makes public the following:

At the request of the United States government, the Air Board has again extended the time limit for a period of six months during which certain classes of United States private and aircraft will, under certain conditions, be permitted to enter and fly in Canada, pending the completion of an official body in the United States having authority to issue civil aviation certificates and licenses in accordance with the International Air Convention. This extension of time covers the period of six months from May 1 to Nov. 1, 1932.

For the information of all concerned the special conditions under which the above aeroplanes will be allowed are reported as follows:

- (1) Only qualified American military or naval pilots will be accepted from the provisions of Part 33 of the Air Regulations, 1920, and there only in so far as it is necessary to put them in the same position with respect to flying in Canada, as if they were the holders of certificates from the government of the United States, in accordance with the International Air Convention, that is, in the position of being entitled to fly United States aircraft in Canada, but not to carry passengers or goods for hire.
- (2) Only American aircraft which would, under the Convention, relating to International Air Navigation, be registrable in the United States will be accepted from the provisions of Part 3 of the Air Regulations, 1920, provided that:
 - (a) Full particulars of the aircraft are furnished.
 - (b) The aircraft is marked in accordance with the Regulations with a nationality and registration mark of which the first letter is the letter "N" and the second letter is the letter "C."
 - (c) If such aircraft is one which under the Regulations would require a certificate of airworthiness, a temporary certificate of airworthiness is issued.
 - (d) In all cases the same fees are paid as in the case of Canadian aircraft.



THE FIVE-ENGINE STINSON-ZEPPELIN MONOPLANE REFLECTED IN THE PERFORMANCE GRAPH OF THE STINSON MONOPLANE

Aviation in Russia

Some interesting information on Russian aerial activities during and after the Great War was recently supplied to our German contemporary *Der Luftwacht* by Andreus Pash, assistant director of the Russian aviation school.

Russian aviation did not begin to develop in any great extent till 1916. During the first two years of the war the Russian army squadrons were mostly equipped with foreign airplanes, but by 1916 the Russian aircraft industry had come into being, and at the end of the war most of the Russian airplanes were of our own manufacture.

The most important airplane factories were in Petrograd, Moscow, and Kiev, which produced such machines as the Sopwith, the Hispano-Breton, which usually built giant airplanes to the designs of Igor Sikorsky; in Moscow the Dux Works, which were building Sopwiths and Spads. The principal factory in Leningrad was the factory of the Anzani and Anzani brothers, the latter of the Anzani type, were turned out under the supervision of the French engineer Dumas. The principal airplane constructor, however, was Gromov, who produced flying boats to the plans of naval engineer Gromovitch. The engines for these machines were mostly imported from abroad, although a number of Gromov machines was supplied by the Moscow branch of the French firm.

As to complete aircraft, France supplied mainly Spads, English Sopwiths, and the United States Curtiss flying boats. Army headquarters had much stress on the pilot not only to be a good pilot, but also to be a good soldier. The foundation, to which end courses were arranged at various schools in Petrograd and Moscow. In Kiev a six months' course was held for observers, and S.C.O. and private photographers were trained at the same place. A meteorological course was held at Puchkovsk by the well-known Professor Kozlovskiy for officers and S.C.O.'s. The importance of meteorological knowledge was considered particularly important in view of the great variety of climates that exist in Russia.

In addition to the general flying school for the training of pilots, special schools were created where private pilots were given instruction in military flying. At the end of the Great War a flight instructor who was in charge of aviation of the respective army group, and a chief instructor was attached to General Headquarters. The direction of the flying school was given by the Petrograd Military Academy, which supported the entire aircraft industry; it was assisted in this endeavor by a committee which gathered funds for the development of a Russian air force and which maintained a flying school of its own.

The Revolution

The revolution broke out just when the Russian air service was at a state of great expansion which represented in Russian aeronautics great hopes for great future development. The revolution checked popular interest in aviation and some airplane production fell off, while at the front the needs of the air service suffered considerably, for it would be pilots and some mechanics. As a result work practically ceased at aircraft depots and parks, and supplies sent to the front were stolen en route. During the Bolshevik revolution the first factory which showed any activity at all, engaging in the conversion of military machines into commercial aircraft.

During the civil war aviation developed chiefly at the northern army, at Arkhangelsk, where Captain Korniloff, the last known Russian flier, was in command of the air force. After the failure of this army, the volunteer army of General Baron Wrangel possessed the strongest air service. This consisted of the start of two squadrons which the Bolsheviks had left behind at Rostov during their retreat, but it gradually expanded, until at the last period of this army it consisted of six aero squadrons. There were five volunteer squadrons and two Red squadrons, each three machines, and three Regiments of six machines each. The South-Russian flying corps also in-

corporated in its fleet a number of airplanes it had captured during its advance on Moscow.

From the very beginning of operations it became clear that the capture of military aircraft followed considerably from those of the World War, and pilots and observers expressed much difficulty in adapting themselves to the changed conditions. Heavy flights were seldom carried out at altitudes greater than 3000 ft., the average altitude being between 2500 and 3000 ft.

As the war was principally waged along the railroad lines, the chief duty of the flier was to keep headquarters correctly advised on military movements, and to observe the movements of the enemy. The most important duty was to keep the front to be held with comparatively small forces. Aerial photography was not engaged in, instead great importance was placed on the cooperation of airplanes in attacking passing the enemy positions.

As the Red made in the interior of Russia made it impossible to move the flight squadrons by motor transport, they were installed in trains.

Reconnaissance

Reconnaissance was a difficult duty in the civil war, as there was no definite front with trench lines to tell friend from enemy. A further inconvenience, commented upon by Lieutenant French, was that "in civil war processes do not exist and therefore no lines on coming the front that of the enemy side can be drawn out will be about as possibly theoretical."

The pilots of the volunteer army also did much dropping of propaganda leaflets behind the enemy lines and this resulted more than once in thousands of Red guardhouses surrounding the Allies supplied the South Russian air service with a number of machines which, though quite modern, were unfortunately all seized for the purpose. Thus one shipment captured Sovietish ground machines, but these proved of little use to the volunteers as there was no opposition to fight with. Their chief need was bombing airplanes, and of all the flying equipment supplied by the Allies only two squadrons of Italian fighters proved really useful.

Although in the civil war the S.C.O. had little task in flight reports, the experience of the civil war largely increased the respect of the commanding officers for the air service. The first squadrons that participated in the campaign in the Donetsky district were the army of General Denikin, who maintained particularly good service. As the railroad from Petrograd to Gromov was continually threatened by revolutionaries, an air mail service was created for military communications.

The Bolshevik Air Service

The main force of the volunteer flying corps was kept in the Caucasus and was commanded by General Tsiolkoff, who had been chief of the imperial air service during the Great War. The Austrian airplane works, which had been transferred to Bolsheviks, were used for repairs and maintenance. The rather poor quality of the machines was not a great disadvantage, for the Bolshevik airplanes crossed the lines of the Wrangel army, although the Soviet authorities are said to spend great sums on aviation and to build much equipment from pre-revolutionary days. Leon Trotsky, Soviet war minister, was deeply interested in the expansion of the Bolshevik air service, but the notwithstanding little progress in being made in putting it in an efficient condition. The chief of the Soviet air service is a young pilot named Gromov, whose principal acquaintance seems to be his being a young Bolshevik. Most of the leading positions of the Soviet air force vacancies are held by young men who have had no previous experience in aviation, being appointed solely for their political beliefs. Only a few of the former imperial Russian air officers are serving with the Soviet air force. As their machines are held in hangars for their faithfulness to the Red regime, it may be imagined that their experience is not of great importance as confidence between headquarters and the squadrons.

Numerous Bolshevik pilots surrendered to the Whites despite the fact that they had Communists for observers, and many valuable military secrets were thus revealed to the enemy. Evidence is given that the Bolsheviks are not so sure of their Red headquarters completely withdrew their squadrons from the front and started to train Lithuanians and Germans. The results were, however, poor, for the new pilots could not use many machines that the only producing service, factory, Dux, could not keep pace with the spare parts and air machines required. So finally the Bolsheviks limited their aerial activities to the use of airplanes for propaganda purposes, chiefly during the visits of foreign guests. An little machine is available for flying, most of it being stolen in transit.

The Bolshevik airplanes use a synthetic fuel called Kerosene, but this is said to be made only in the Caucasus. Most aviation developed much more quickly in Russia than military aviation, because the Admiralty disposed of larger funds for this purpose than the war department. At the beginning of the war the Russian navy had in service a few Curtiss and S.W.A. flying boats, and some French float airplanes, most of which sustained the requirements of the police. For this reason the admiralty called upon Russian designers to turn out improved designs. Success gradually became the chief contractor of the Russian navy and his aircraft, which were built to the designs of the naval engineer Grigorovich, formed the main equipment during the war. The principal models used were the M.5, a two-seater float with the Hispano-Breton engine, the Salmson type, three-seater M.5, and the M.10 two-seater, fitted with the Hispano-Breton 150 hp engine. The fighting qualities of these craft were poor, but in ocean the machines were very stable and earned a huge profit for the navy.

The naval air service was organized on different lines in the Baltic and in the Black Sea. In the Baltic the navy department created an airplane station on islands and along the coast, while in the Black Sea some attention was paid to the carrying of naval aircraft on motorships. Inside the bay-line formations used at the various naval air stations the admiralty also created land personnel squadrons to guard the bay-line formations. In the Black Sea there was also created a naval airplane station, but two aircraft procured from Great Britain proved of little value and so the station was soon given up. Shortly before the outbreak of the revolution the Russians produced the general flying boat M.23, which was fitted with a Hispano-Breton engine. This machine proved a success, but it could not be put in production because of the revolution.

During the civil war the Wrangel army had a small naval air service under Captain of Virginia Litvinoff, who during the Great War commanded the Baltic naval aviation. It comprised mostly old Russian airplanes, and also a number of Albatross machines, which the Germans had taken from the Bolsheviks during their retreat from the Ukraine. In the Caucasus British naval pilots, operating airplane stations, caused the South Russian camp. The Russian volunteer army also possessed two naval flying detachments on the Caspian Sea, where they were active against the Azerbaijan Red forces.

On the Bolshevik side the naval aviation also seems to be more interesting than the army aviation. This applies especially to the pilots of the Azerbaijan fleet. The first formation operating on the Black Sea had a deficiency of aircraft and fuel and some other, too, but, says the writer "the pilots only had a red patch, being white by inclination, for which reason they agreed willingly with the White forces."

The main station of Petrograd, was destroyed by an explosion, while much material was lost during the Bolshevik retreat from Petrograd to Yaroslavl.

Airplane Estimate of Hurricane Damage

Another example of the application of aircraft to peace law projects, with a successful saving of time and expense, is afforded by the accurate nature of the recent hurricane damage in Florida by the Hurricane Division. Three flights in three days at an estimated cost of \$22,254, 214 what would probably have cost in the neighborhood of \$225,000 by ground survey work, greatly underbids by the Army Air Service and the Coast Service, was done in three 301-45 machines from Hatteras Field. The first day, two machines carried members of the Air Service detachment and a Forest Service Sketcher over the damaged area. The second day two machines carrying

a photographer and the sketcher built the pilots made a reconnaissance. The work was completed on the third day when the three machines, with the detachment and sketcher, flew over the area. The report of the work outlined a number of features, a very much more than one, and several others.

A study of the map shows the storm to have been gusty in character, blowing down timber in some areas and leaving it untouched in others. From the masses the number of trees blown down can be estimated. The devastated area covers 2000 square miles of valuable timber land in country particularly dense of trees.

New Aircraft Insurance Rules

The executive committee of the National Aircraft Underwriters Association has drafted coverages for the season's business. Several changes have been necessitated by reason of the heavy losses during the past year.

The executive committee felt that the rates must be kept down to as low a level as possible. When rates are already high (as aircraft rates necessarily are) it does not ordinarily help the experience to any appreciable extent, to make the rates still higher. Some other way must be found to account the poor experience. Flying machines will undoubtedly improve from year to year, and ways and means will also be found for reducing loss, cost and repair bills; but the best opportunity of all for reducing the loss ratio appears to be in the adoption of a modified form of coverage, whereby the insured becomes a co-insured.

It has been decided, therefore, that the fire, transportation, theft, windstorm and lightning coverages shall all contain the 75 per cent loss payable feature, whereby the company pays three-quarters of each loss (or three-quarters of the excess portion of each loss for each coverage that bears a deductible feature).

The companies hope to bring about a considerable improvement in the experience by the use of this clause. There is no question but what an insured will be a little more thoughtful and perhaps a little more careful if he knows that he is not to be fully reimbursed for each loss that may occur. Furthermore, experience depreciates very rapidly. An amount of insurance which is less than the correct value of the plane at the time of insurance may really prove to be an excess of the market value of that plane before termination of the policy period. It is true that the policy is written on a "non-value" basis; nevertheless the insured is not always thoroughly familiar with the method of settlement and he carries in his mind and anticipates the amount of insurance for which the plane is insured. He is apt then to be depressed with the thought that a total loss under certain circumstances might cause some hardship to him, or in any event, that his share of the loss would be practically all.

The remedy, then, is not only to remove any possibility of a benefit accruing to the insured by reason of a loss, but also to make it worth while for the insured to exercise extreme care in the maintenance and operation of the plane. It was decided that the best means of accomplishing this was through the adoption of the 75 per cent loss payable clause. The companies writing aircraft insurance are anxious to help the aircraft business in every possible way. By placing a premium on carelessness, the companies are not only encouraging the prevention of accidents, but they are also striving to place aircraft insurance in its own feet. The aircraft insurance business cannot long continue unless there are prospects of reducing the loss ratio to a normal level.

The collision and windstorm coverages are written with a 5 per cent deductible amount, subject to a maximum of \$500. The theft clause is written with \$100 deductible clause.

In writing airplanes, the windstorm and tornado coverage is excluded with standing and ending coverage into what is called "floating peril". The regular collision coverage for airplanes is now called "float collision". Collision claims are slightly reduced for land planes where a warranty is attached to the effect that the plane shall remain at all times within gliding distance of a specified landing field.

Bids on Naval Shipboard Planes

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